



CONSERVATION CURRICULUM



Last Year in Review

For those of you who were not subscribers to *The Resource* last year or who may need reminding of the wealth of information in those issues, here is a recap of their contents. If you would like to receive copies of any of these issues contact Barb Byrne at 573/751-4115 x3287, byrneb@mdc.state.mo.us

Myths & Mysteries - *October 2001*: Articles describing various ways plants make our life possible, debunking myths regarding graveyards, swamps and caves, and extolling the virtues of spiders, snakes and owls.

Energy - *December 2001*: Ideas for teaching students the concepts of how energy exists naturally in our world, basic forms of energy and their definitions, renewable energy sources, and ideas for using your school building as an energy learning lab.

Agriculture and Private Lands - *February 2002*: A focus on some non-traditional aspects of agriculture – fish farming, agroforestry, a synopsis of programs offered by Conservation's Private Land Services, and how agriculture impacts all of us.

Connecting Schools and Communities - *April 2002*: Tips on planning field trips with a purpose, incorporating service learning in the classroom, and finding valuable education resources close to home.

Conservation Careers

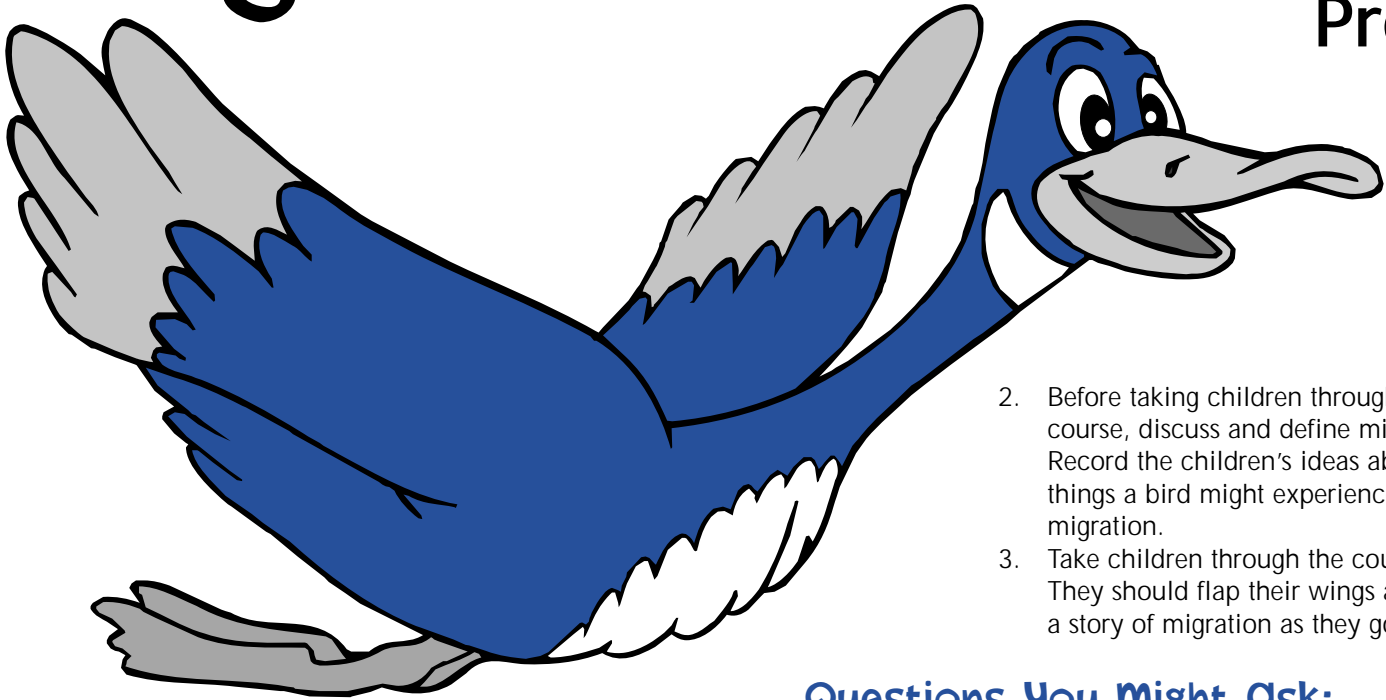
Naturalist

A naturalist is one of many careers in conservation education. Naturalists conduct interpretive programs including hikes, classroom activities and public presentations with a focus on natural resources and conservation. Many naturalists work at nature centers or state parks. They develop interpretive signage for trails, design exhibits, conduct programs for school groups, train volunteers and help the general public learn about the natural features of the site. Their work involves doing research, preparing informational materials, working with teachers and community members to prepare programs, writing news articles and developing visual aids. Working with props ranging from bird feathers and bones to turtles and tree pods, naturalists help people of all ages learn about natural resources, the environment and how people can be good stewards of the earth.

Naturalists with the Missouri Department of Conservation have graduated from an accredited college or university with a Bachelor's Degree in a Science or Wildlife area and have some interpretation or teaching experience.

Migration Scene

PreK-2



From: *Conservation Seeds*,
Missouri Department of Conservation

Did You Know?

The seasonal movement of birds and other animals is called migration. Migration may be triggered by reduced hours of sunlight, a food shortage or colder temperatures. There are many theories as to how birds find their way. Some ornithologists believe some birds follow mountain ranges, coastlines or rivers. Birds flying over the ocean are thought to follow the stars or angle of the sun. This activity will introduce the concept of migration to children.

You'll Need:

Equipment for a course, such as balance beam, climber, carpet squares, mats, streamers, stuffed animals, etc.

What To Do:

1. Set up a course using any materials at hand. Keep in mind various migration scenes the course could represent, such as balance beam "river," climber "mountain," streamers hung for "rain," carpet squares representing "food," large boxes for "buildings," stuffed animal "predators," etc.

2. Before taking children through the course, discuss and define migration. Record the children's ideas about things a bird might experience during migration.
3. Take children through the course. They should flap their wings as you tell a story of migration as they go.

Questions You Might Ask:

- Why do you think some birds migrate and others don't?
- How do you think birds know where to go in the winter?
- What dangers must birds look out for?
- How do birds know where it is safe to rest and find food?

Supplementary Activities:

Manipulative – During self-selected activity time, encourage children to sort the birds from the Missouri Department of Conservation's *Missouri Game Birds* and *Woodland Songbirds* posters or animal cards into those that fly south for the winter and those that don't.

Outside – Observe birds migrating.

Story – Read *Goodbye Geese*. (Nancy White Carlstrom. New York: Scholastic Inc., 1991.) A young child asks his parent about the arrival of winter and migrating geese.

3-4

CA - 6
FA - 1
SC - 3, 4, 7

Play-dough, tooth picks, miscellaneous crafts, e.g. plastic eyes, glitter, popsicle sticks, construction paper, pipe cleaners, straws, cotton balls, Q-tips, any other materials that your imagination can come up with.

Discuss adaptations of animals that are well-known to them. How does a coyote "make a living?" Its acute senses help to find food, e.g. good eyesight, hearing, and sense of smell. It has legs made to help it run fast. It has sharp teeth to capture and devour its prey. For older students, discuss how adaptations are important for an animal to fill its niche.

1. Divide into small groups of 4 or less.
2. Give each group an animal description and tell them to construct their animal based on the description.
3. Encourage students not to make a "real" animal, e.g. bat, woodpecker, bear, wolf, etc. Rather have each group construct a "new" animal and invent a name for it.

After all groups have finished their animals, have a spokesperson from each group:

- Show and give the name of the animal they constructed.
- Read the animal's description.
- Describe the animal's adaptations, i.e., Why did they make the animal the way they did?

Description Cards

1. You are an animal that eats flying insects.
2. You are an animal that captures and eats a very fast prey.
3. You are an animal that moves slowly and eats other animals which live in the forest.
4. You are an animal that eats creatures that live in the soil.
5. You are an animal that eats creatures that are active at night.
6. You are an animal that eats creatures that live in dead trees.
7. You are an animal that eats seeds that grow from large trees.
8. You are an animal that eats plants, but moves very slowly and can be easily attacked by other creatures.

Aquatic Descriptions

1. You are an animal that lives along the edge of a swamp and eats flying insects.
2. You are an animal that lives on the surface of the water and its prey are small animals.
3. You are an animal that dives down into the water to capture fish to eat.
4. You are an animal that lives in and around aquatic plants and attacks/eats a very fast prey.
5. You are an animal that eats aquatic plants and digs into the ground for protection.
6. You are an animal that lives in the water, and you attach yourself to other animals sucking their fluids.
7. You are an animal that eats fish and other animals that live in the shallow parts of a pond.
8. You are an animal that eats phytoplankton and zooplankton.

Wrap up:

1. Discuss what adaptations the constructed animals have that reflect those found in real life animals.
2. How do these adaptations help the animals survive in their particular habitats?



Winter Bird Feeding

Objectives

Students will 1) describe the role humans play in helping birds survive the winter; 2) identify species of birds that winter in Missouri; 3) identify seeds that provide food for wintering birds; 4) observe how different species of birds interact; 5) develop journal writing skills.

Materials

- Bird Feeder
- Seeds
- Recyclable Disposable cups or bowls
- Missouri Department of Conservation *Winter Birds Identification* brochure (Publication E431)
- Individual Journals

Preparation

1. Install a bird feeder. See copy page for plans students can use to build a feeder.
2. Discuss the benefits of feeding birds that stay in Missouri for the winter.
3. Collect and show pictures of Missouri's winter birds.
4. Discuss the different types of seeds and winter food available.
5. Have students decide which seeds would be the best to use in your homemade seed mix. Use the Missouri Department of Conservation *Backyard Bird Feeding* chart as a guide. (Publication E450)
6. Discuss how to do journal entries.

Sample Journal Entry

December 20, 9:30 am, cloudy, 47°F, slight northerly breeze

Two birds came to the feeder together. One was brilliant red, but the other was a little darker, almost brownish, and not nearly as pretty. Both had a crest of feathers on their head and heavy red bills. They fed on the sunflowers seeds that had spilled out of the feeder on to the ground. Soon a large bright blue bird arrived. It was twice as big as the red birds. It landed on the feeder and made a mess throwing seeds all over. The red birds seemed startled by its arrival and left shortly thereafter.

Procedure

1. Place the birdfeeder in a location that can be easily seen from the classroom window.
2. Divide the class into small groups of 3-4.
3. Have each group prepare some seed mix based on what the class decided in the preparation phase.
4. Have a student from each group pour their mix into the feeder.
5. Post the bird identification chart near the window that overlooks the feeder.
6. Whenever a bird (or other animal) comes to feed, have students write what they are seeing in their journals. – Is it one bird or several? What does it look like? How big is it? How long does the bird stay? What is the birds' behavior at the feeder? Are different types of birds competing with each other? If another animal tries to feed, what kind of animal is it? Was the animal successful in getting food from the feeder? How do the birds react to other animals at the feeder?
7. Have students share what they have written in their journals.
8. Use the shared entries as a point for further discussion.

Extensions

Students can make Bird Wreaths, as described in *Outside In*, to use in addition to (or in place of) the bird feeder. If using the wreaths and the bird feeder, students can journal what they observe at both sites and then compare the differences based on the different types of food. If using only the wreaths, discuss the types of food that the students are putting on the wreaths and track which species of bird prefer which type of food.

Supplementary Activities

Art – Have students decorate the covers of their journals. They can use colored markers to design, sketch or draw nature-related pictures or they can make a collage on the cover by cutting out pictures of winter scenes, birds, etc. and pasting them on.



Language Arts – Have students choose one species of bird they have observed and write a paragraph or short paper describing what they have learned about that bird's habits.

Math – Have students keep track of or compute such things as: How many ounces/pounds of seed did they put in the feeder to start and how much do they add each week? What's the total amount of food eaten all winter? Track the total number of each species of bird for a week and then compute the percentage of each species that ate at the feeder for the week. Track the time of day a certain species comes to feed and compute the elapsed time between feedings for that species. (Class can be divided into groups and each group could track a different species.)

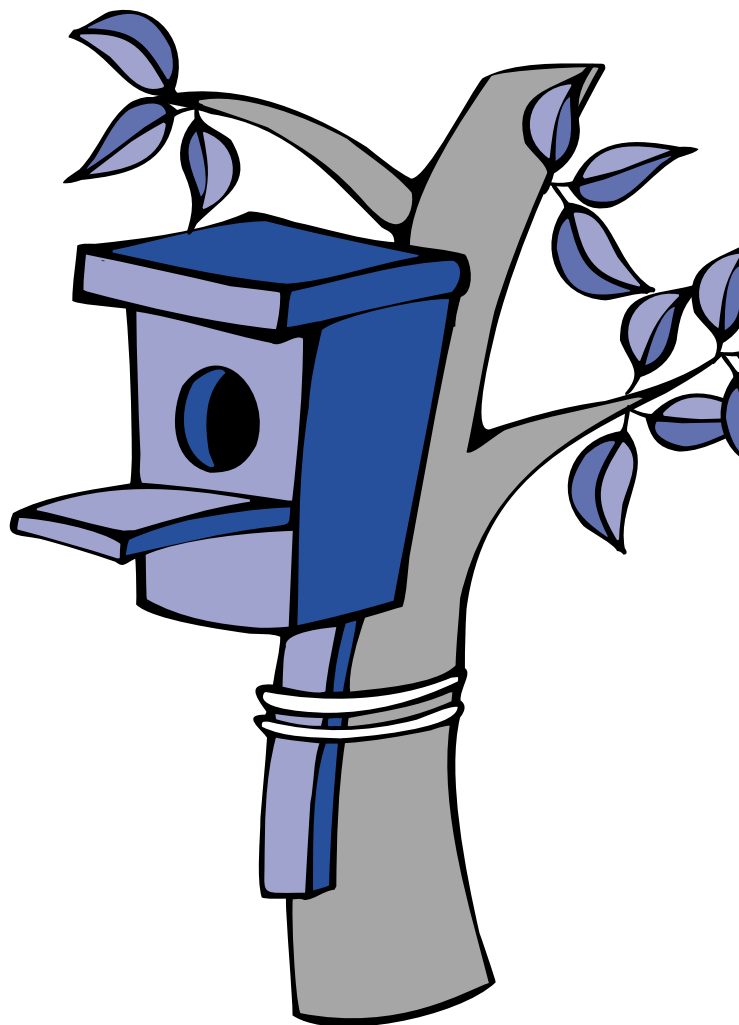
Installation: The feeder can be mounted on a post as diagrammed or hung, using wire from a coat hanger. Place it in a site where you can enjoy watching your customers from the comfort of your home. Preferably, the feeder should be near bushes or trees to provide the birds with avenues of approach and retreat. You can attempt to discourage competing squirrels by installing the feeder on a 6-foot-high post or pipe, at least 20 feet away from points from which they can jump. Then fasten an inverted cone of sheet metal at least 18 inches in diameter around the post just beneath the feeder.

Maintenance: Flour will accumulate on the floor of the feeder and, when combined with moisture, forms a hard paste. This must be scraped off so that the seed feeds through properly and the drain holes remain functional.

How to Build a Bird Feeder

From: *Woodworking for Wildlife*, Missouri Department of Conservation

Construction: The Plexiglas sides show the level of the feed. However, Masonite can be used instead. Either material can be attached with screws or nails directly to the edges of the ends, or you can saw a kerf 1/4 inch from the front edge of the ends, and slide Plexiglas, Masonite, or glass panels into the groove. A removable panel of this type permits easier cleaning. The 6 1/2 inch-wide Plexiglas should be installed so that its top edge meets the roof, thus providing the critical 1-inch clearance at the bottom for proper seed flow.

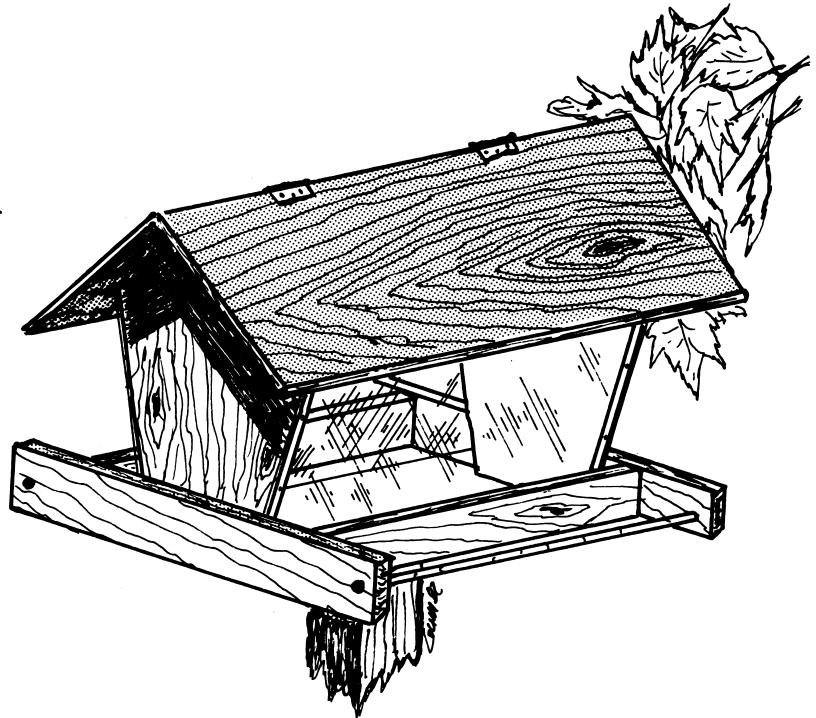


HOW TO BUILD A BIRD FEEDER

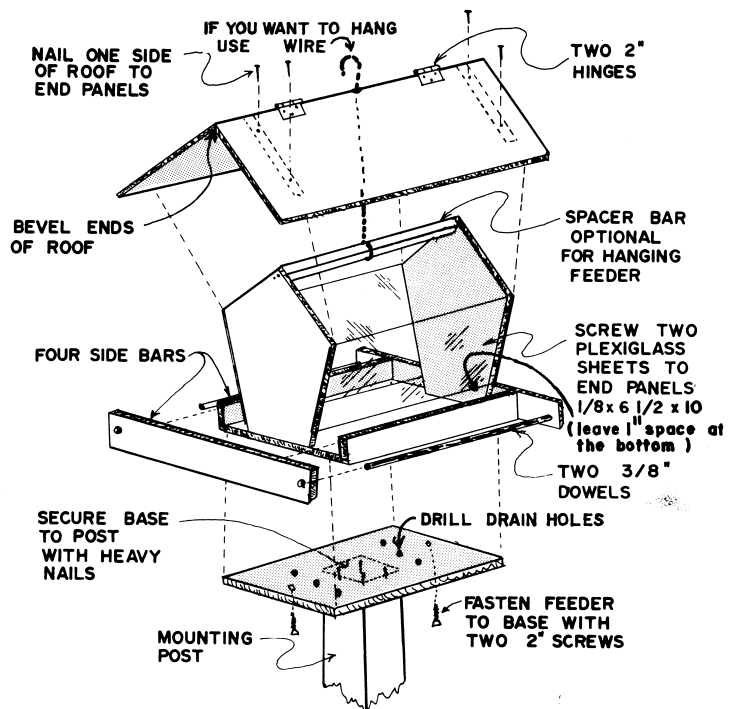
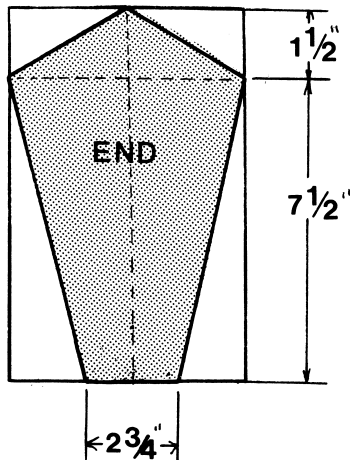
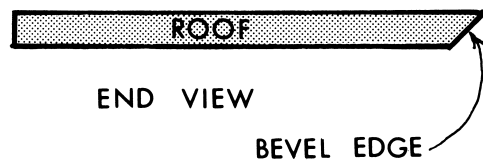
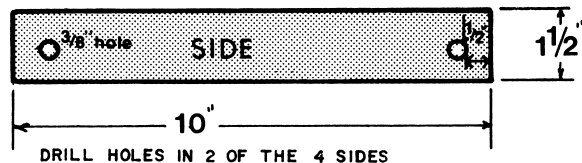
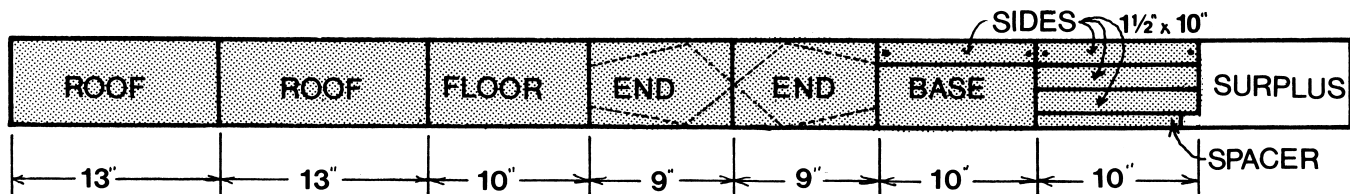
Drawings
by Steve Gum



Missouri Department of Conservation



ALL PARTS FROM A SINGLE 1" x 6" BOARD 7' LONG



Steve Gum

9-12 Birds of Prey

From: *Project WILD*

Objectives

Students will: 1) interpret a graph of animal populations, noting changes over time; 2) hypothesize the relationship between temperature, ground squirrel behavior and falcon populations; 3) describe the importance of interdependence to the functioning of an ecosystem.

Standards

Goal 1 – 2, 5, 6	CA – 1, 4, 5, 6
Goal 2 – 3	MA – 3, 6
Goal 3 – 5	SC – 3, 4, 7, 8
Goal 4 – 1	

Method

Students interpret data on wildlife populations, generate hypotheses related to the data and research potential explanations.

Materials

Graphs A-E enlarged for classroom use; Optional: photographs of predator and prey species.

Background

In the Birds of Prey Natural Area in southwestern Idaho, a large number of prairie falcons nest in late spring and early summer each year. The falcons mainly live off a large population of Townsend ground squirrels that live in the surrounding flatlands. Throughout the breeding season, the population of falcons increases as more and more birds move into the area to nest, until all available nesting sites are taken. Since the Townsend ground squirrels serve as the food base for the falcons, continued activity and availability of this prey base is crucial for the support of the nesting falcons. As the summer progresses, the daytime temperatures in the area increase to a point (around July 4th) where it is too hot for the ground squirrels, and they go underground and undergo a form of summer sleep called "aestivation" or summer hibernation. Without available prey, the falcons and their new offspring must either leave or die. Within a day of the ground squirrels' aestivation, nearly all falcons capable of flight move out of the area in search of other food (other ground squirrel species and rodents). Most move to higher, cooler elevations where other species of ground squirrels (such as Columbian ground squirrels) remain active. This sudden seeming "loss" of

falcons from the Birds of Prey area is directly tied to the important environmental factor of temperature.

The major purpose of this activity is for students to recognize that life forms and environmental factors interact in natural ecosystems to keep wildlife populations in long-term dynamic equilibrium with each other and their habitats.

Procedure

1. Set the stage by giving students the following background information:

The Birds of Prey Natural Area in Idaho hosts the largest concentration of nesting prairie falcons in the world each spring and summer. The birds nest along the cliffs above the Snake River and use the huge Townsend ground squirrel population for food. This prey species lives on the flat land above the canyon. Each year, the populations of these two species change from April through July.

2. Show the students Graph A. Have them look at the graph to see what happens to the populations of predator and prey, and answer the following questions:
 - What do you observe happening?
 - What do you notice about the Townsend ground squirrel population in April, May and June?
 - What do you notice about the ground squirrel population in July?
 - What do you think caused this drop in population? What might have happened to the squirrels?
 - What do you notice about the falcon population in April and May?
 - What do you notice happening to the falcon population in July? What do you think caused this population decline?
 - What might have caused the change?
 - How do these populations seem to be related?

Ask the students to speculate, offer hypotheses and develop questions to assist with finding a solution to this dilemma.

3. Show the students Graphs B, C, D, and E. Using the information provided on these graphs, encourage students to discuss their ideas and hypotheses.



4. Ask the students to share those ideas that seem to be most reasonable given the information presented in the graphs.
5. Summarize the activity by:
Closed inquiry approach – Review the sequence of events. Discuss the role of temperature in triggering aestivation. Ask the students to predict what the falcons might do if their food source “disappeared.” Where might they find the falcons after they leave the area? Where would they go to obtain food? What kind of prey species might they use? Have the students suggest other physical factors that influence or limit wildlife activity. Have the students also propose some ways these same factors influence or limit human activity.
 OR
Open inquiry approach – Do not provide the above information, but allow student teams to research information on the squirrels and falcons.



6. Extend the discussion to the concept of interdependence in ecological systems. What was interdependent in this situation? Encourage the students to think of other examples of interdependence. Can they think of any ecosystems that are not composed of interdependent parts? Generalize that all ecosystems are made up of interdependent parts.

Extensions

1. The prey ordinarily used by the falcons at the natural area – the Townsend ground squirrel – is distributed throughout much of the plains area above the river, which is also potentially good agricultural land. Given this information, the activity could be extended to an investigation into competitive uses for the land occupied by the prey base, the legislation behind the establishment of the natural area and/or related controversies.
2. Investigate the process by which such natural areas are set aside, the agencies involved and related issues.
3. Describe the usefulness of mathematical data in interpreting relationships between organisms in ecosystems, using the Birds of Prey Natural Area as an example.

Evaluation

1. Using Graph A as a reference, describe for each month between April and July:
 - a. relative population levels of squirrels and falcons
 - b. the behavior of squirrels and falcons
 - c. the role of temperature on a and b above
2. Explain the importance of interdependence to an ecosystem.

